IN THE UNITED STATES
PATENT AND TRADEMARK OFFICE

PATENT APPLICATION

Appellant(s):	**Asmussen et al.**	Case:	**SEDN/5313**
Serial No.:	**09/921,057**	Filed:	**August 3, 2001**
Group Art Unit:	**2161**	Examiner:	**DAYE, CHELCIE L.**

Title: **Video and digital multimedia aggregator content suggestion engine**

Confirmation #: **8084**

MAIL STOP APPEAL BRIEF-PATENTS
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

SIR:

APPEAL BRIEF

Appellants submit this Appeal Brief to the Board of Patent Appeals and Interferences on appeal from the decision of the Examiner of Group Art Unit 2161 dated January 11, 2007 finally rejecting claims 1-11 and 21-33.

In the event that an extension of time is required for this appeal brief to be considered timely, and a petition therefor does not otherwise accompany this appeal brief, any necessary extension of time is hereby petitioned for.

The Commissioner is authorized to charge the Appeal Brief fee ($500) and any other fees due to make this filing timely and complete (including extension of time fees) to Deposit Account No. 20-0782/SEDN/5313.

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Real Party in Interest

The real party in interest is SEDNA PATENT SERVICES, LLC.

Related Appeals and Interferences

Appellants assert that no appeals or interferences are known to Appellants, Appellants' legal representative, or assignee which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

Status of Claims

Claims 1-11 and 21-33 are pending in the application. Claims 1-33 were originally presented in the application. Claims 12-20 are withdrawn. Claims 1-11 and 21-33 stand finally rejected as discussed below. The final rejection of claims 1-11 and 21-33 is appealed.

Status of Amendments

All claim amendments have been entered.

Summary of Claimed Subject Matter

Embodiments of the present invention generally are directed to an apparatus for suggesting available aggregated content from a plurality of media sources in a digital communications network. The apparatus may produce keywords or metadata elements, not suggested by a user, for looking for and suggesting content.

For the convenience of the Board of Patent Appeals and Interferences, Appellants' independent claims 1 and 21 are presented below in claim format with elements read on the various figures of the drawings and appropriate citations to at least one portion of the specification for each element of the appealed claims.

Claim 1 positively recites (with reference numerals, where applicable and cites to at least one portion of the specification added):

1. (previously presented) An apparatus (300) for suggesting available aggregated content from a plurality of media sources (204) in a digital communications network (200), comprising:

a content metadata crawler (309) that searches metadata related to the available aggregated content from the plurality of media sources (204) and produces a metadata list, wherein the metadata list comprises a plurality of metadata elements, and wherein each metadata element comprises one or more metadata fields (see e.g., Applicants' specification, p. 16, ll. 11-18);

a suggestion keyword indexer (310) coupled to the content metadata crawler, (309) wherein the suggestion keyword indexer (310) receives the metadata list and indexes the metadata elements (see e.g., Applicants' specification, p. 16, ll. 19-31);

a suggestion database (308) coupled to the suggestion keyword indexer (310) that stores the indexed metadata elements (see e.g., Applicants' specification, p. 16, ll. 19-31); and

a suggestion database processor (307) coupled to the content metadata crawler (309), the suggestion keyword indexer (310) and the suggestion keyword

database (308), wherein the suggestion database processor (307) searches the suggestion database (308), based on one or more search request criteria, to produce a list of keywords to be used to suggest content from the plurality of media sources (see e.g., Applicants' specification, p. 16, l. 19 – p. 17, l. 2).

Claim 21 positively recites (with reference numerals, where applicable and cites to at least one portion of the specification added):

21. (previously presented) An apparatus (300) for suggesting available aggregated content from a plurality of media sources (204) in a digital communications network (200), comprising:

first searching means (309) for searching metadata related to the available aggregated content from the plurality of media sources (204) and producing a metadata list, wherein the metadata list comprises a plurality of metadata elements, and wherein each metadata element comprises one or more metadata fields (see e.g., Applicants' specification, p. 16, ll. 11-18);

means (310), coupled to the first searching means (309), for receiving the metadata list and indexing the metadata elements (see e.g., Applicants' specification, p. 16, ll. 19-31);

means (308), coupled to the indexing means (310), for storing the indexed metadata elements (see e.g., Applicants' specification, p. 16, ll. 19-31); and

second searching means (307), coupled to the first searching means (309), for searching the storing means (308), based on one or more search request criteria, to produce a list of metadata elements to be used to suggest content from the plurality of media sources (see e.g., Applicants' specification, p. 16, l. 19 – p. 17, l. 2).

Grounds of Rejection to be Reviewed on Appeal

The Examiner has rejected claims 1 and 21 under 35 U.S.C. §103(a) as being unpatentable over Balogh US Patent No. 5,493,677, filed June 8, 1994 (hereinafter Balogh) in view of Dudkiewicz US Patent No. 6,651,253 filed November 16, 2001 (hereinafter the Dudkiewicz '253 patent); Provisional November 16, 2000 (hereinafter the Dudkiewicz provisional application),

The Examiner has rejected claims 2-3, 5-11, 22-23, and 26-33 under 35 U.S.C. §103(a) as being unpatentable over Balogh in view of Dudkiewicz, as applied to claim 1 above, and further in view of Cappi US Patent Application No. 20020038308 filed May 27, 1999 (hereinafter Cappi).

The Examiner has rejected claims 4, 24, and 25 under 35 U.S.C. §103(a) as being unpatentable over Balogh in view of Dudkiewicz and further in view of Cappi and further in view of Karaali US Patent No. 6,182,028 filed November 7, 1997 (hereinafter "Karaali").

ARGUMENTS

I. THE EXAMINER HAS FAILED TO ESTABLISH A *PRIMA FACIE* CASE OF OBVIOUSNESS IN REJECTING CLAIMS 1-11 AND 21-33 UNDER 35 U.S.C. §103(A) BECAUSE THE EXAMINER IS USING PRIOR ART AGAINST THE APPELLANTS' INVENTION THAT IS NOT A PROPER REFERENCE UNDER 35 U.S.C § 103 (A).

A. 35 U.S.C. § 103(a) – Claims 1 and 21

The Examiner has rejected claims 1 and 21 under 35 U.S.C. §103(a) as being unpatentable over Balogh in view of the Dudkiewicz '253 patent relying upon the priority date of the Dudkiewicz provisional application. Appeal of this rejection is respectfully requested.

The Appellants urge the Board to reverse the Examiner's rejection because the Dudkiewicz '253 patent is not a proper reference against the Appellants' invention. Therefore, the Examiner has failed to establish a prima facie case of obviousness against the Appellants' invention.

The effective filing date of the present patent application is August 3, 2001. The Examiner has attempted to apply the Dudkiewicz '253 patent against the present patent application, which has a filing date of November 16, 2001. Notably, the filing date of the Dudkiewicz '253 patent is after the filing date of the Appellants' invention.

However, to apply the Dudkiewicz '253 patent against the Appellants' invention, the Examiner is attempting to use the priority date claimed by Dudkiewicz to provisional application number 60/249,179, filed on November 16, 2000. Therefore, if the Examiner is relying on the Dudkiewicz provisional application, then the Examiner is effectively using the Dudkiewicz provisional application as a prior art reference instead of the Dudkiewicz '253 patent.

The Appellants respectfully submit that the Dudkiewicz '253 patent is not the same reference as the Dudkiewicz provisional application because a

provisional application may have a different specification from that of a 1.111 application that claims priority to the provisional application. Under 35 U.S.C. § 119(e), for a non-provisional application to properly claim benefit to a provisional application, the invention in the non-provisional application must be disclosed as required under § 112, first paragraph, in the provisional application. *New Railhead Mfg., L.L.C. v. Vermeer Mfg. Co.*, 298 F.3d 1290, 63 USPQ2d 1843, 1846 (Fed. Cir. 2002).

In the present case, the Examiner relies on the Dudkiewicz '253 patent to teach the limitation of "the suggestion database processor searching the suggestion database, based on one or more search request criteria, to produce a list of keywords to be used to suggest content from the plurality of media sources." The Examiner cites the Dudkiewicz '253 patent at column 12, line 39 to column 13, line 8. Within the Examiner's citation, the Dudkiewicz '253 patent teaches that the metadata generator may additionally provide automatic generation of keywords. (See the Dudkiewicz '253 patent, col. 12, ll. 53-54.) This teaching of the Dudkiewicz '253 patent is necessary to read on the Appellants' limitation of "wherein the suggestion data processor searches the suggestion database . . . to produce a list of keywords to be used to suggest content . . ." or "second searching means . . . for searching the storing means . . . to produce a list of metadata elements to be used to suggest content . . ." (See Appellants' claim 1 and 21, *supra*.)

However, the Dudkiewicz provisional application fails to support this invention of the Dudkiewicz '253 patent and, thereby, fails to satisfy the requirements of §112, first paragraph which is required to properly claim priority under 35 U.S.C. § 119(e). The Appellants have thoroughly reviewed the Dudkiewicz provisional application and cannot find a single teaching or suggestion of a metadata generator providing automatic generation of keywords. Notably, the Dudkiewicz provisional application mentions keywords, but only teaches that keywords may be extracted from searches or used for comparison. (See the Dudkiewicz provisional application, p. 33, sEXTR002; p. 53, cUP017) A copy of the Dudkiewicz provisional application is herein provided for the

convenience of the Board. The Appellants are submitting a copy of the Dudkiewicz provisional application for the record as the Examiner failed to provide a copy for the record when requested by the Appellants. (See Advisory Action, dated March 28, 2007, p. 2, first paragraph.)

The Appellants presented the above argument to the Examiner in the response to Final Office Action dated January 11, 2007, filed by the Appellants on March 12, 2007. However, rather than responding by providing explicit support and citations in the Dudkiewicz provisional application, the Examiner simply responded that the Examiner "believes" the provisional application of the Dudkiewicz reference [i.e the Dudkiewicz provisional application] discloses all of the rejected limitation for which it was relied upon. (See Advisory Action, dated March 28, 2007, p. 2, first paragraph.)

In response, the Appellants requested an Examiner interview to obtain specific citations to the Dudkiewicz provisional application to support the Examiner's position. During an Examiner interview conducted on April 25, 2007, the Examiner attempted to point to various portions of the Dudkiewicz provisional application that allegedly support the teaching that the metadata generator may additionally provide automatic generation of keywords, as taught in the Dudkiewicz '253 patent. (See e.g., the Dudkiewicz provisional application, p. 24, cEPG005; cUP002.) However, none of the citations provided by the Examiner support the teachings in the Dudkiewicz '253 patent. At best, the citations provided by the Examiner only teach that the invention may suggest content. However, the Dudkiewicz provisional application fails to teach or suggest that the content may be suggested based upon a search with keywords automatically generated by a metadata generator.

The Appellants understand that the Dudkiewicz provisional application is not required to explicitly repeat word for word what is taught in the Dudkiewicz '253 patent. However, even given the broadest reasonable interpretation of the Dudkiewicz provisional application, the Dudkiewicz provisional application simply does not disclose that the metadata generator may additionally provide automatic generation of keywords as taught by the Dudkiewicz '253 patent. Therefore, the

Dudkiewicz provisional application and the Dudkiewicz '253 patent are not a proper references against the Appellants' invention.

As a result, the Examiner has failed to establish a *prima facie* case of obviousness against the Appellants' invention. The Examiner relies on the combination of Balogh and the Dudkiewicz provisional application in rejecting the Appellants' claims 1 and 21. As set forth above, since the Dudkiewicz provisional application is not a proper reference against the Appellants' invention, the Examiner's rejection of claims 1 and 21 under 35 U.S.C. § 103(a) must fall.

As such, it is respectfully submitted that independent claims 1 and 21 are patentable over the cited references under 35 U.S.C. 103. Therefore, Appellants respectfully request that this rejection under 35 U.S.C. §103(a) be withdrawn.

Rejection of Claims 2-3, 5-11, 22-23 and 26-33 Under 35 U.S.C. §103(a)

The Examiner has rejected claims 2-3, 5-11, 22-23, and 26-33 under 35 U.S.C. §103(a) as being unpatentable over Balogh in view of Dudkiewicz, as applied to claim 1 above, and further in view of Cappi. Appeal of this rejection is respectfully requested.

Claims 2-3, 5-11, 22-23 and 26-33 depend directly or indirectly from independent claims 1 and 21, respectively, and recite additional limitations thereof. Moreover, as discussed above, neither the Dudkiewicz provisional application nor the Dudkiewicz '253 patent is a proper reference against the Appellants' invention.

As a result, the Examiner has failed to establish a *prima facie* case of obviousness against the Appellants' invention. The Examiner relies on the combination of Balogh, the Dudkiewicz provisional application and Cappi in rejecting the Appellants' claims 2-3, 5-11, 22-23 and 26-33. As set forth above, since neither the Dudkiewicz provisional application nor the Dudkiewicz '253 patent is a proper reference against the Appellants' invention, the Examiner's rejection of claims 2-3, 5-11, 22-23 and 26-33 under 35 U.S.C. § 103(a) must also fall.

As such, it is respectfully submitted that these dependent claims are patentable over the cited references under 35 U.S.C. 103. Therefore, Appellants respectfully request that this rejection under 35 U.S.C. §103(a) be withdrawn.

Rejection of Claims 4, 24 and 25 Under 35 U.S.C. §103(a)

The Examiner has rejected claims 4, 24, and 25 under 35 U.S.C. §103(a) as being unpatentable over Balogh in view of Dudkiewicz and further in view of Cappi and further in view of Karaali. Appeal of this rejection is respectfully requested.

Claims 4, 24 and 25 depend directly or indirectly from independent claims 1 and 21, respectively, and recite additional limitations thereof. Moreover, as discussed above, neither the Dudkiewicz provisional application nor the Dudkiewicz '253 patent is a proper reference against the Appellants' invention.

As a result, the Examiner has failed to establish a *prima facie* case of obviousness against the Appellants' invention. The Examiner relies on the combination of Balogh, the Dudkiewicz provisional application and Karaali in rejecting the Appellants' claims 4, 24 and 25. As set forth above, since neither the Dudkiewicz provisional application nor the Dudkiewicz '253 patent is a proper reference against the Appellants' invention, the Examiner's rejection of claims 4, 24 and 25 under 35 U.S.C. § 103(a) must also fall.

As such, it is respectfully submitted that these dependent claims are patentable over the cited references under 35 U.S.C. 103. Therefore, Appellants respectfully request that this rejection under 35 U.S.C. §103(a) be withdrawn.

CONCLUSION

Thus, Appellants submit that all of the claims presently in the application are allowable under the provisions of 35 U.S.C. §103(a).

For the reasons advanced above, Appellants respectfully urge that the rejections of claims 1-11 and 21-33 are improper. Reversal of the rejections of the Final Office Action is respectfully requested.

Respectfully submitted,

6/28/07
Date

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CLAIMS APPENDIX

1. (previously presented) An apparatus for suggesting available aggregated content from a plurality of media sources in a digital communications network, comprising:

a content metadata crawler that searches metadata related to the available aggregated content from the plurality of media sources and produces a metadata list, wherein the metadata list comprises a plurality of metadata elements, and wherein each metadata element comprises one or more metadata fields;

a suggestion keyword indexer coupled to the content metadata crawler, wherein the suggestion keyword indexer receives the metadata list and indexes the metadata elements;

a suggestion database coupled to the suggestion keyword indexer that stores the indexed metadata elements; and

a suggestion database processor coupled to the content metadata crawler, the suggestion keyword indexer and the suggestion keyword database, wherein the suggestion database processor searches the suggestion database, based on one or more search request criteria, to produce a list of keywords to be used to suggest content from the plurality of media sources.

2. (previously presented) The apparatus of claim 1, wherein the suggestion keyword indexer, comprises:

an extraction module that extracts and caches a value of each metadata field;

a parsing module coupled to the extraction module that parses contents of uniquely identifying metadata fields, wherein the contents of a uniquely identifying field comprise one or more word items;

a classifying module coupled to the parsing module that classifies one or more of the one or more word items;

a comparison module coupled to the classifying module that compares one or more of the one or more word items to determine a list of related terms; and

an index matrix record builder that creates and augments an index matrix record for each of the classified word items.

3. (original) The apparatus of claim 2, further comprising one or more of a dictionary database, a thesaurus database and a lexicon database, wherein the comparison module compares a word item to entries in one or more of the dictionary database, the thesaurus database and the lexicon database, and wherein the list of related terms includes one or more of a dictionary definition, lexicon data, and one or more synonyms.

4. (original) The apparatus of claim 2, wherein the classifying module comprises one or more computational linguistics tools, including a rule-based part-of-speech tagging algorithm and a stochastic part-of-speech tagging algorithm, wherein the one or more computational linguistic tools determine part-of-speech data of a word item, and wherein the index matrix record builder adds the part-of-speech data to the index matrix record for the word item.

5. (original) The apparatus of claim 2, wherein the uniquely identifying fields comprise one or more of content type, content title, date of production, rating and parental notice information, performer, artist, writer, author, plot summary, keyword list, and textual content description.

6. (original) The apparatus of claim 2, wherein the index matrix record builder comprises a vector assignment module that assigns a word item vector value for a word item, wherein the word item vector value may be used as a measure of similarity between a word item and a related term.

7. (original) The apparatus of claim 6, wherein the suggestion database processor, comprises:

a vector determination module that assigns a search term suggestion vector range to one or more of the search request criteria; and

a vector value comparator that compares a vector value of a search term and the word item vector value to determine if the word item vector value falls within the suggestion vector range of the search term, wherein word items that fall within the suggestion vector range may be used to search for suggested content.

8. (original) The apparatus of claim 7, wherein the suggestion vector range is adjustable by a user of the apparatus.

9. (original) The apparatus of claim 8, further comprising a user-defined filter, comprising: a user history filter; a user profile filter; and an approved content access filter, wherein the suggestion database processor processes search results from the suggestion database using the user-defined filter to produce the list of suggested content.

10. (original) The apparatus of claim 9, further comprising a ranking module, wherein the ranking module ranks content in the list of suggested content.

11. (previously presented) The apparatus of claim 10, wherein the ranking module ranks the content according to one or more of a user historical analysis report and similarities to previously accessed content by the user.

12. (withdrawn) A method for suggesting available content in a digital communications network, comprising:

receiving a search request from a user of the digital communications network;

comparing the search request to a database of indexed metadata elements;

caching indexed metadata elements that satisfy the search request; retrieving a user profile for the user; and

filtering the cached metadata elements according to the user profile ranking the filtered metadata elements; and

providing the ranked metadata elements to a search request processor as criteria for returning suggested content.

13. (withdrawn) The method of claim 12, wherein the database of indexed metadata elements, comprises one or more of content type, content title, date of production, rating and parental notice information, performer, artist, writer, author, plot summary, keyword list, and textual content description.

14. (withdrawn) A method for suggesting available content in a digital communications network, comprising:

constructing a database of indexed metadata elements; receiving a content search request from a user of the digital communications network; comparing the search request to the database of indexed metadata elements;

caching indexed metadata elements that satisfy the search request;

retrieving a user profile for the user;

filtering the cached metadata elements according to the user profile; ranking the filtered metadata elements; and

providing the ranked metadata elements to a search request processor as criteria for returning suggested content.

15. (withdrawn) The method of claim 14, wherein constructing the database of indexed metadata elements, comprises:

opening one or more metadata records in the content metadata database; for a current one of the one or more metadata records, determining if end-of-file has been reached, reading an entire metadata entry of the current metadata

record, wherein the current metadata record comprises one or more of one or more non-uniquely identifying fields and one or more uniquely identifying fields, and wherein each of the one or more uniquely identifying fields comprises one or more terms, extracting and caching a value for each term for one or more of the one or more uniquely identifying fields, and parsing and caching terms of each of the uniquely identifying fields.

16. (withdrawn) The method of claim 15, further comprising, for each cached term:

determining if an index record exists for the cached term; and

if no index record exists, creating an index matrix record, and adding the cached value to the index matrix record.

17. (withdrawn) The method of claim 16, wherein creating the index matrix record, comprises:

determining a part of speech of the term to determine part of speech data;

comparing the term to thesaurus data to determine similar terms, and

storing the part of speech data and the similar terms as the index matrix record.

18. (withdrawn) The method of claim 15, wherein a metadata crawler crawls a content metadata database of indexed metadata elements to construct the database of indexed metadata elements.

19. (withdrawn) The method of claim 18, wherein the metadata crawler crawls the content metadata database continually.

20. (withdrawn) The method of claim 18, wherein the metadata crawler crawls the content metadata database when directed by a metadata processor.

21. (previously presented) An apparatus for suggesting available aggregated

content from a plurality of media sources in a digital communications network, comprising:

first searching means for searching metadata related to the available aggregated content from the plurality of media sources and producing a metadata list, wherein the metadata list comprises a plurality of metadata elements, and wherein each metadata element comprises one or more metadata fields;

means, coupled to the first searching means, for receiving the metadata list and indexing the metadata elements;

means, coupled to the indexing means, for storing the indexed metadata elements; and

second searching means, coupled to the first searching means, for searching the storing means, based on one or more search request criteria, to produce a list of metadata elements to be used to suggest content from the plurality of media sources.

22. (previously presented) The apparatus of claim 21, wherein the indexing means, comprises:

extraction means for extracting and caching a value of each metadata field;

parsing means coupled to the extraction means, for parsing contents of uniquely identifying metadata fields, wherein the contents of a uniquely identifying field comprise one or more word items;

classifying means, coupled to the parsing means, for classifying one or more of the one or more word items;

comparing means coupled to the classifying means for comparing one or more of the one or more word items to determine a list of related terms; and

means for creating and augmenting an index matrix record for each of the classified word items.

23. (original) The apparatus of claim 22, further comprising one or more of a

dictionary database, a thesaurus database and a lexicon database, wherein the comparing means compares a word item to entries in one or more of the dictionary database, the thesaurus database and the lexicon database, and wherein the list of related terms includes one or more of a dictionary definition, lexicon data, and one or more synonyms.

24. (original) The apparatus of claim 22, wherein the classifying module comprises means for analyzing linguistics.

25. (original) The apparatus of claim 24, wherein the means for analyzing linguistics comprises one or more computational linguistics tools, including a rule-based part-of-speech tagging algorithm and a stochastic part-of-speech tagging algorithm, wherein the one or more computational linguistic tools determine part-of-speech data of a word item, and wherein means for creating and augmenting an index matrix record adds the part-of-speech data to the index matrix record for the word item.

26. (original) The apparatus of claim 22, wherein the uniquely identifying fields comprise one or more of content type, content title, date of production, rating and parental notice information, performer, artist, writer, author, plot summary, keyword list, and textual content description.

27. (original) The apparatus of claim 22, wherein the means for creating and augmenting an index matrix record comprises means for assigning a word item vector value for a word item, wherein the word item vector value may be used as a measure of similarity between a word item and a related term.

28. (original) The apparatus of claim 27, wherein the second searching means, comprises:

means for assigning a search term suggestion vector range to one or more of the search request criteria; and

means for comparing a vector value of a search term and the word item vector value to determine if the word item vector value falls within the suggestion vector range of the search term, wherein word items that fall within the suggestion vector range may be used to search for suggested content.

29. (original) The apparatus of claim 28, wherein the suggestion vector range is adjustable by a user of the apparatus.

30. (original) The apparatus of claim 29, further comprising means for filtering search results.

31. (original) The apparatus of claim 30, wherein the means for filtering search results, comprises:

a user history filter;

a user profile filter; and

an approved content access filter, wherein the means for creating and augmenting an index matrix record processes search results from the means for storing the indexed metadata elements using the user-defined filter to produce the list of suggested content.

32. (original) The apparatus of claim 31, further comprising means for ranking content in the list of suggested content.

33. (original) The apparatus of claim 32, where in the ranking means ranks the content according to one or more of a user historical analysis report and similarities to previously accessed content by the user.

EVIDENCE APPENDIX

1. Provisional patent application 60/249,179, filed on November 16, 2000 to Dudkiewicz.

RELATED PROCEEDINGS APPENDIX

None.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES PROVISIONAL PATENT APPLICATION

For

SYSTEM, DEVICES AND PROCESSES FOR CUSTOMIZED DIGITAL TELEVISION VIEWING IN ACCORDANCE WITH A VIEWER PROFILE

By

Gil G. Dudkiewicz

Software Requirements Specification

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Software Requirements Specification

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Note: The lower-case letter at the beginning of each requirement identifier (c, s, or a) indicates whether the requirement refers to the Consumer DTV application, the MyDTV Server application, or the TV Station Agent application.

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1 Scope

1.1 Identification

This document is the Software Requirements Specification (SRS) for the DTV project. This document is identified as Taldor-TICI document number 202-DTV-010-001.

1.2 System Overview

The MyDTV system is a comprehensive digital television recording and viewing package which will greatly enhance the TV viewing experience. The system has been designed for the reality which will exist in the not-too-distant future – hundreds of channels containing a multitude of programs, only a small fraction of which are of interest to each viewer. The MyDTV system will allow users to define their preferences, and will then search all available channels to find the programs that match the user's interests.

The system's main features are:

- Definition of user profiles which represent the viewer's interests.
- Automatic selection and recording of programs on the basis of the user profiles. The user's profile is compared with metadata[1] transmitted together with program broadcasts, in order to determine whether or not to record the program.

In addition, the system provides the following:

- Recording of programs manually selected by users from electronic program guides (EPGs).
- The ability to record a program, and simultaneously play back the recording with a delay, thus allowing viewers to join a program late yet still view it in its entirety.
- The ability to play back at any time any of the programs recorded.
- A sophisticated archive system for storing programs that have been recorded.

Note: The term "program" is used throughout this document to refer to the material to be recorded. Actually, the MyDTV system will be capable of recording three different types of programs – movies, shows, and clips. The term "shows" refers to all programs other than movies. "Clips" are individual segments that make up a show. By treating shows as collections of clips, the system can match the user's preferences more accurately, for example, by recording only the individual clips that match the categories and subcategories selected by the user.

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[1] In this context, the term "metadata" refers to data that describes a program that is to be broadcast, specifically, the name of the program and the program categories to which it has been assigned.

At this time, very few stations provide information down to the level of individual clips. This will be taken into account when determining loads, etc.

The main elements of the MyDTV system are depicted in Figure 1-1.

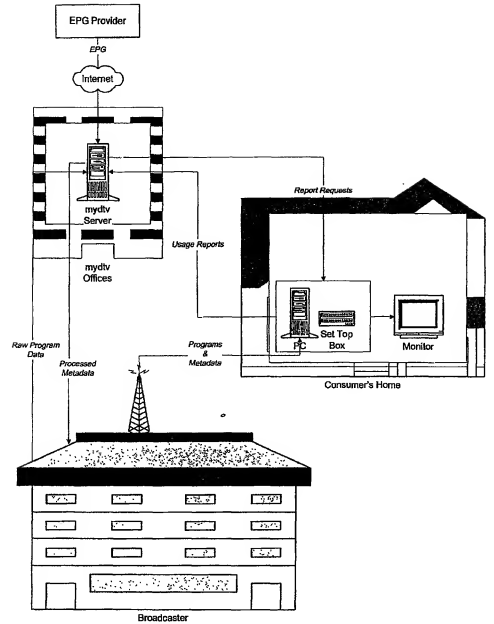

Figure 1-1 System Elements

1.3 System Operation – Basic Sequence

The basic sequence of the system's operation is as follows:

1. Users define a user profile representing their areas of interest. This is done by selecting one of the standard profiles provided and then fine tuning the preferences.
2. The MyDTV server receives raw data about the programs to be broadcast, from the TV station.
3. The MyDTV server analyzes program content, categorizes this content, and then sends the processed metadata to the broadcasting party.
4. The metadata is broadcast together with program content, arriving early enough to allow the software on the consumer's PC to process the data and decide whether to record a program.
5. The MyDTV software on the consumer's PC compares the metadata with the user profile and decides which programs should be recorded. These programs are added to a *To Be Recorded* list.
6. The user receives notification of new programs that have been added to the *To Be Recorded* list.
7. At the appropriate time, the software begins recording the program.
8. When recording is complete, the program is added to a *Recorded Program* list.
9. The user can view any of the programs on the *Recorded Program* list at their convenience.
10. Recorded programs are stored on the user's disk until a request is made to delete them.

1.4 Basic Configuration - With/Without Internet Connection

The system will be designed to work in two different configurations – with an Internet connection and without an Internet connection. The software requirements described in this document include requirements that will apply to both configurations, as well as a number of requirements that will be applicable only when using the "with Internet connection" configuration. (Requirements that are applicable only when there is an Internet connection will appear in this document with the following symbol next to them: ⇆).

It is assumed that in the future, the ideal configuration will be "with Internet connection" since it will allow advanced features such as the sending of usage reports.

Note: When the Internet-related requirements are implemented, they will take into account two possible types of connections: an "always-on" connection, and a "periodic" connection.

2 Referenced Documents

Document ID	Document Name
	MyDTV Product Specification (MyDTV document, July 16, 2000)

3 Requirements for the Consumer DTV Application

3.1 Assumptions

The requirements described below are based on the following assumptions:

- The metadata is sent to the Consumer DTV application no later than t_{3_pr} seconds before the broadcast to which the metadata relates, in order to allow sufficient time for analysis and decision-making.
- The TV card software and remote will allow the user to change the channel currently being viewed.
- The TV card software and remote will provide controls for performing the following actions: changing the channel, setting channel frequencies.

Note: In the prototype, the consumer's computer and the MyDTV server will be simulated by two computers on the same LAN.

Note: Anywhere the term MPEG is used in this document, it refers to the MPEG-2 standard.

3.2 Constraints

- If it is decided that the software should allow the user to view one program while a second one is being recorded, two RF inputs will be required.
- Since only one RF input will be available for recording and metadata scanning, the software will only be able to resume metadata scanning after recording has been completed. Therefore, there will be a certain period following recording during which it will not be possible to record programs.[2]
- Since regular viewing of television programs will also use the single RF input, scanning of metadata will similarly be unavailable when the consumer is watching regular (non-recorded) TV. Thus, here too, there will be a certain period following program viewing during which it will not be possible to record programs.
- A 40 GB hard disk will be required at the consumer's end.

[2] Alternatively, the software can be designed such that this "dead time" will result only if the two RF inputs are being used to simultaneously view one program and record another, or to simultaneously record two different programs. In all other cases, the two RF inputs can be used for simultaneous recording and metadata scanning, thus preventing this "dead time" problem. 6-Nov-00

3.3 Software Requirements – Consumer DTV

The requirements for the Consumer DTV application can be divided into the following categories:

- General
- Program viewing control
- Personal Video Recorder (PVR) control
- Electronic Program Guide (EPG)
- User Profile
- User Commercial Profile[3]
- Comparison of Metadata and User Profiles
- The *To Be Recorded* list
- Recording notification[3]
- Program recording
- The *Recorded Program* list
- Program playback
- Program archiving
- DRB (hardware) control
- Logging
- Usage reports (⇆)[3]
- Communication sessions[3]
- System configuration[3]
- Software modes[3]
- Updating of the software[3]
- Performance-related requirements

The software requirements for each of these categories are described below.

General

cGEN001 The software will run on a PC with the Windows 98 or Windows NT operating system.

cGEN002 Navigation will be based on on-screen menus.

[3] Not included in the Prototype stage

cGEN003 The application's menus will be navigated using a remote control device.

cGEN004 Text input from the user will be entered via an on-screen keypad.

cGEN005 The user interface will be designed in a way that it will be possible to navigate the menus using only the arrow-type keys and function keys that are currently available for standard set top box remote controls. The PC version of the software will also allow mouse-based navigation.

cGEN006 A data-verification mechanism, such as checksums, will be used to ensure that all metadata is received intact by the consumer DTV application.

Program Viewing Control[4]

cVIEW001 The software will provide the user with an option of viewing recording status on screen when a program is being recorded.

cVIEW002 The software will be capable of resizing the program viewing area of the screen, when this is necessary in order to accommodate GUI elements such as menus.

cVIEW003 Even when menus are being displayed, part of the TV viewing area will always be visible.

Personal Video Recorder (PVR) Control

cPVR001 The software will provide controls to begin recording a program immediately.

cPVR002 The software will provide the following controls for controlling digital video playback: play, pause, rewind, forward[5], skip to next clip[6].

cPVR003 The software will provide a visual indication that indicates whether the program currently being viewed has already been recorded or is currently being recorded.

Electronic Program Guide (EPG)

cEPG001 The software will be capable of importing EPGs that are in the following format: TBD.[7]

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[4] The exact viewing controls provided will depend upon the abilities of the TV card used.

[5] The term "forward" here refers to forwarding while viewing a picture. There is no need for a "fast forward", i.e., forward with no picture, feature since this is only used on videos to reduce head wear and tear. 6-Nov-00

[6] May also include skipping to specific markers within a clip.

cEPG002 The software will be capable of displaying all of the programs listed in the EPG.

cEPG003 The software will allow the user to add programs from the imported EPG to the To Be Recorded list.

cEPG004 The software will allow the user to filter the display of EPG information on the basis of any of the types of data provided by the EPG for each program (for example, date, time, channel).

cEPG005 The software will allow the user to search the imported EPG for programs using the following criteria: date, program name, keywords. Any programs that match the search criteria will be displayed.

cEPG006 The software will allow the user to add programs from the search results list to the *To Be Recorded* list.

cEPG007 The software will allow the user to request that a given program in the EPG be recorded on a regular basis, for example, every day or every week.

cEPG008 If a user selects a program for recording, which conflicts with a program already scheduled to be recorded, the user will be notified of this conflict and will be able to decide which program should be recorded.

User Profile

cUP001 The software will allow the user to select categories of programs that they wish to record, and will allow the selection of subcategories within these categories (for example, the user can choose to record all NFL football games, or just games involving the Miami Dolphins or San Diego Chargers).[8]

cUP002 When defining a user profile, users will select a profile from a list of standard profiles (such as "sports freak", "talk show junkie"), and the appropriate categories will be chosen automatically.[9,10] The user will then be able to modify the selected profile to fine tune it to their preferences.

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[7] The most popular EPGs, for example, TV Guide, are broadcast directly to the user.

[8] Where necessary, the software will support a hierarchy of subcategories, not just one level of subcategories.

[9] If the user selects a standard profile, they can still modify their profile just as they would a "regular" profile.

[10] The standard profiles may also include channel preferences, limiting recording to specific channels.

cUP003 The software's interface will provide a visual indication to indicate whether an entire category is chosen or only certain subcategories within that category.[11]

cUP004 The software will allow the user to limit program searches to specific channels. If this option is used by the user, a program will only be recorded if it matches at least one of the categories selected AND is being broadcast on one of the selected channels.

cUP005 The software will provide a mechanism for prioritizing category selections in order to overcome any recording conflicts that may arise if the user profile dictates that two programs broadcast at the same time[12] be recorded.

cUP006 The software will provide a mechanism for prioritizing subcategory selections within a given category in order to overcome any recording conflicts that may arise if the user profile dictates that two programs broadcast at the same time be recorded.

cUP007 If a conflict arises as a result of a demand to record two programs simultaneously – one program selected manually by the user from the EPG and one program selected automatically based on the user profile – the program selected manually by the user will always take precedence.

cUP008 The software will provide the user with the option of not setting priorities. In such cases, the software will use a default conflict-resolution scheme, such as FIFO (using the program start time as the criterion), or, alternatively, by giving longer programs priority over shorter programs.

cUP009 The current user profile will be displayed when the user wishes to modify their profile.[13]

cUP010 The software will allow the use of only one user profile on a single machine.[14]

Comparison of Metadata and User Profiles

The following requirements refer to the mechanism which will compare user profiles with the metadata in order to determine which program should be recorded. The term "metadata" here

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[11] Such as a filled-in check box vs. a half-filled check box.

[12] The expression "same time" here also refers to programs that do not actually overlap in terms of time, but that can still not both be recorded because of the "dead time" resulting from the use of only one RF input for both recording and metadata scanning (see Section 3.2).

[13] Thus, the user will not have to redefine everything from scratch. 6-Nov-00

[14] Multiple-profile support will be included in Phase I.

refers to data that has undergone analysis and that will consist of a number of variables, such as category to which the program belongs, subcategory, and keywords extracted from the program title.

cCOMP001 Metadata will be compared against all of the defined user profiles[15] in order to determine whether a program should be recorded.

cCOMP002 If a program has already been recorded, it will not be recorded a second time if it is broadcast again.[16]

cCOMP003 The analysis mechanism will be able to initiate the deletion of a program from the *To Be Recorded* list, on the basis of updated metadata, for example, notification that the program will not be broadcast.

cCOMP004 The software will be capable of extracting the following types of data, which will be included as part of the metadata sent to the consumer: EPGs, standard user profile definitions, special notification.

cCOMP005 The software will check the ID of each metadata package received. The metadata will be handled only if the package has not been received previously.

The *To Be Recorded* List

cTBR001 The software will maintain an up-to-date *To Be Recorded* list that will contain all programs that are scheduled to be recorded. This will include both programs scheduled manually by the user from the EPG and programs scheduled automatically by the metadata analysis mechanism.

cTBR002 The *To Be Recorded* list will display the following information for each program: title, ..., source (manual/automatic/if automatic, which user profile).

cTBR003 The software's user interface will allow the user to delete items from the *To Be Recorded* list.

cTBR004 After an item has been deleted from the *To Be Recorded* list, the software will allow the user to "undo" the deletion and restore the program title to the list.

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[15] Obviously, in the prototype it will only be compared against one user profile.

[16] Not only will the program not be recorded, it will not even be subjected to the profile-metadata analysis. One way of doing this would be by having an ID for every program that could be checked before it is checked for compatibility with the defined user profiles. If necessary this number could be added by the MyDTV Server application. This feature may be problematic if different channels broadcast the same program using different titles for the program. 6-Nov-00

cTBR005 Items on the *To Be Recorded* list will be removed from the list after they have been recorded.

cTBR006 The software will be capable of automatically removing programs from the *To Be Recorded* list, on the basis of updated information received in the framework of the metadata. If a program is removed from the *To Be Recorded* list using this mechanism, the user will be notified of the change.

cTBR007 The software will be capable of converting the channel information stored in the *To Be Recorded* list to the appropriate frequency information.[17]

Recording Notification

cNTF001 The software will notify the user when it schedules a program for recording. Upon receiving this notification, the user can request to see the details of the program that is to be recorded.[18]

cNTF002 Upon receiving notification of a program that is to be recorded, the user will be presented with the option of instructing the software not to record the program. If a user response is not received within a predefined period of time, the program will be recorded.

cNTF003 The details of the programs that are being recorded will be stored in a cumulative "notification list". This list will always show the new programs that have been recorded since the last time the user checked the list.

cNTF004 After the user checks the "notification list" its contents will be cleared.

cNTF005 If a program has already been recorded, it will be removed from the "notification list" even if the user has not checked the list.

cNTF006 For each program on the "notification list", the priority of the category to which it belongs will be displayed. By default, the programs in the list will be listed in order of category priority. The user will be able to re-sort the list using any of the other types of information displayed, such as channel or time of broadcast.

Program Recording

cREC001 The software will be capable of initiating program recording according to the start time and channel information contained in the *To Be Recorded* list.

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[17] In terms of design, this will require a channel-to-RF conversion table.

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[18] The user will be notified with a non-intrusive element such as an icon, likes the kind used to notify that a person has received e-mail.

cREC002 When a program is recorded, the software will save the following program information: date, category matched.....file name.

cREC003 If technically possible, the software will be capable of recording closed-caption data (intradata, teletext) in addition to program data (video and audio).

cREC004 Since it will not be possible to view a program and record a second program simultaneously.[19] If a program is being viewed when a program scheduled to be recorded begins, the user will be asked which program should take precedence.

Recorded Program List

cRPL001 The software will maintain an up-to-date *Recorded Program* list that will contain all programs that have been recorded.

cRPL002 The *Recorded Program* list will be displayed as a single list for all programs. The user will also be provided with an option of viewing the list as three sub-lists – one each for movies, shows, and clips[20]. Both for the single-list display and the sub-list display, the default display order will be based on the start time of the programs recorded.[21]

cRPL003 The software will provide a visual indication that indicates which user profile a program was recorded for.

cRPL004 For programs on the *Recorded Program* list that were recorded based on the user profiles, the software will optionally display the different categories and how many programs/clips were recorded in each category.[22]

cRPL005 The user can request to see a list of programs recorded for a single category.

cRPL006 After a program has been viewed, it will be removed from the *Recorded Program* list.

cRPL007 The software will allow the user to manually remove a program from the *Recorded Program* list.

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[19] Since there will only be one RF input.

[20] Perhaps by using a "tabs" design.

[21] For the "clip" sub-list, the default order to be used may be content-based, conforming as much as possible to the order commonly used for news broadcasts, for example, news then sports then weather. 6-Nov-00

[22] By default, categories will be displayed.

Program Playback

cPLAY001 The software will be capable of initiating playback of any program that has been recorded.

cPLAY002 The software will be able to play compressed recordings.[23]

cPLAY003 The software will allow the user to select a number of programs from the *Recorded Program* list, and will then play these programs back in the order requested.

cPLAY004 Any time a user selects a program for playback, this information will be saved by the software.

cPLAY005 When the user selects a number of programs for playback, the software will save the order requested by the user.

cPLAY006 The software will allow the user to select an entire category of programs from the *Recorded Program* list, and will then play all of the programs recorded for the requested category.

cPLAY007 The software will provide a default playback option of simply playing back all of the recorded programs in the order in which they were recorded.[24]

cPLAY008 The software will be capable of playing back programs with or without the closed-caption data displayed.

Program Archiving

cARC001 The software will maintain an *Archive* list, which will include all programs currently stored on the hard disk.

cARC002 After recording of a program has been completed, its name will be added to the *Archive* list.

cARC003 The *Archive* list will include an indication for each program that indicates whether the program has been viewed already.

cARC004 The software will allow the user to select a program from the *Archive* list for playback.

cARC005 The software will allow the user to manually delete from the disk programs that have been recorded.[25]

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[23] This refers to the type of compression used by the software when it records programs. Ideally, the programs will be compressed in MPEG-II format.

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[24] Alternatively, another factor such as category priority or "hit" score can be used for the default playback order.

cARC006 The software will allow the user to select multiple programs for deletion. In addition, the software will allow the user to select groups of programs for deletion, using criteria such as date recorded and category.

cARC007 When the user has indicated that they would like to delete specific programs, the software will ask for confirmation of the request before actually deleting the files. The software will provide an option of disabling this deletion confirmation feature.

cARC008 After a program has been deleted from the *Archive* list[26], the software will allow the user to "undo" the deletion and restore the program file.

cARC009 The software will provide a disk-space-limit mechanism for automatic deletion of recorded programs after the defined limit has been exceeded. A warning message will be displayed for the user before such automatic deletion is carried out. Once the disk space limit has been exceeded, programs will be deleted on a FIFO basis, using the program's start time as the criterion.[27]

cARC010 The software will allow the user to copy programs from an external source. These copied programs will be added to the *Archive* list.

DRB (hardware) Control

cHWC001 The software will be able to work with a TV card from one of the following manufacturers:

- Hauppauge
- Broadlogic
- Pinnacle
- ATI Systems
- Diamond Multimedia

cHWC002 The software will be able to retrieve the metadata and the program data from the data that was broadcast.

cHWC003 The software will control the TV card's scanning of the various frequencies.

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[25] Deletion of programs from disk will be performed using the *Archive* list.

[26] i.e., from the disk.

[27] The warning message that is displayed may also contain the titles of the programs that are going to be deleted.

Logging

cLOG001 The software will log any changes to user profiles.

cLOG002 The software will log any changes to the *To Be Recorded* list.

cLOG003 The software will log specific information for the programs recorded (such as the beginning and end of program recording).

cLOG004 The software will log the display of error messages.

cLOG005 There will be a time-based mechanism for deleting old log files. Files will be deleted on a FIFO basis.

Performance-related Requirements

cPERF001 The software will allow up to 2 channels to be scanned.

cPERF002 The software will be capable of scanning 2 channels within t_{scan2} seconds.[28]

cPERF003 The software will support a maximum of n_c categories and subcategories.

cPERF004 The Consumer DTV application will be capable of restarting itself in the event that it crashes.

3.4 Required Hardware – Consumer DTV

The Consumer DTV application will require the following hardware:

- PC with Pentium III 600 MHz or higher processor
- Hauppauge WinTV card or BroadLogic TBD card
- If WinTV card is used, one of the following video cards is required:
  - ATI Mach 64 8 MB, or RAGE II
  - Matrox Millenium or Mystique

3.5 Required Software – Consumer DTV

The Consumer DTV application will require the following software:

- NT Workstation 4.0 or Windows 98/2000
- Access (Jet) database
- Microsoft Media Player Format 6.4
- Microsoft Media Player Encoder 6.4

[28] The current estimate is that this will require 15 seconds.

4 Requirements for the MyDTV Server Application

4.1 Assumptions

- The MyDTV server will have a permanent IP address.
- The MyDTV Server application will receive as input a list of programs, which will include the program titles and the following additional information: TBD.
- The EPG will be downloaded from a third-party provider via the Internet.

4.2 Software Requirements – MyDTV Server

The requirements for the MyDTV Server application can be divided into the following categories:

- Communication
- Extraction of program data and keywords
- Assignment of programs to categories and subcategories
- Assignment of program ID and program type
- Downloading of EPG
- Data sent to TV Station Agent application
- Database management
- Report generation
- Logging
- Messages to the consumer
- New versions of Consumer DTV application
- Performance-related requirements

The software requirements for each of these categories are described below.

Communication

sCOMM001 The TCP/IP protocol will be used for sending the raw program data from the TV Station Agent application to the MyDTV server, and for sending the metadata from the MyDTV server to the TV Station Agent application.

sCOMM002 The MyDTV Server application will be capable of establishing communication with the TV Station Agent application.

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sCOMM003 The MyDTV Server application will be able to respond to attempts by the TV Station Agent application to initiate a communication session.

sCOMM004 (=) The MyDTV Server application will be capable of establishing communication with the Consumer DTV application.

sCOMM005 The MyDTV Server application will be capable of establishing communication with a third-party EPG provider.

Extraction of Program Data and Keywords

sEXTR001 The software will analyze the data received from the TV Station Agent application, and extract the following information: program title, start time, time zone information, program duration.

sEXTR002 The software will be capable of extracting keywords from the program title for each program.

sEXTR003 The software will be capable of receiving a timestamp from the TV Station Agent application together with the raw program data.[29]

Assignment of Programs to Categories and Subcategories

sCAT001 The software will analyze the program titles and assign each program to one or more categories, and if relevant, to one or more subcategories.

Assignment of Program ID

sPID001 The software will assign each program a unique program ID.

Assignment of Program Type

sTYPE001 The software will assign each program to one of the following types: movie, show, clip.

Downloading of EPG

sEPG001 The software will be able to download an EPG from a third-party provider.

Data Sent to TV Station Agent Application

sSENT001 For each program, the software will send the following data to the TV Station Agent application: program title, program type, list of categories to which it belongs, list of subcategories to which it belongs, time program begins, time zone information for program, program duration, the keywords for the program, and program ID.

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[29] This timestamp will be used to synchronize the consumer's computer's time with that of the TV station.

sSENT002 The software will be capable of providing the TV Station Agent application with data in a format that will allow the TV Station Agent application to encode the data.

sSENT003 A data-verification mechanism, such as checksums, will be used to ensure that all metadata sent is received intact by the consumer DTV application.

sSENT004 A unique metadata ID will be assigned to each individual transmission of metadata. The ID will be linked to the specific content, therefore it will not be changed if the same content is retransmitted.

Database Management

sDB001 The software will allow the addition of categories and subcategories to the category database.

sDB002 The software will not allow the deletion of categories and subcategories from the category database.

Note: While it will not be possible to delete categories and subcategories, the software will allow the "hiding" of categories and subcategories. When a category is "hidden", it will remain in the database but will not be active. It will be necessary to include a mechanism that notifies the consumers of any such changes to categories and subcategories.

sDB003 The software will be able to store EPG data in the database.

sDB004 The software will be able to store data regarding specific TV stations, such as IP address and newsroom software used, and will allow the modification of such data.

sDB005 The software will be able to store parsing-related data for specific types of newsroom software, such as field names, and characters used for delimiting data.

Logging

sLOG001 The software will log all input received from the broadcaster, consumers, and other parties.

sLOG002 The software will log all output sent to the broadcaster, consumer, and other parties.

sLOG003 The software will log all errors.

sLOG004 The software will log all changes to user profiles.

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sLOG005 The software will provide a number of standard logging levels, which will determine which information will get logged at any given time.[30]

sLOG006 There will be a time-based mechanism for deleting old log files. Files will be deleted on a FIFO basis. It will be possible to set different time-deletion rules for each type of log.

Messages to the Consumer

sMES001 The software will be able to send messages to the consumer together with the broadcast data.

sMES002 The software will be able to send standard user profiles to the consumer together with the broadcast data.

Performance-Related Requirements

sPERF001 The MyDTV Server application will support a maximum of 100 consumers.

sPERF002 The MyDTV Server application will support a maximum of 2 TV stations.

sPERF003 The MyDTV Server application will support a maximum of 2 channels.

sPERF004 The MyDTV Server application will meet the following reliability criterion: TBD.

sPERF005 The length of the data-processing cycle for the MyDTV Server application will be shorter than the length of the cycle for sending the processed data to the Consumer DTV application.

sPERF006 The MyDTV Server application will be capable of restarting itself in the event that it crashes.

4.3 Required Hardware – MyDTV Server

4.4 Required Software – MyDTV Server

The MyDTV Server application will require the following software:

- NT Server 4.0
- Oracle database

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[30] This will allow more detailed logging when possible, and more limited logging when constraints require it.

5 Requirements for the TV Station Agent Application

The TV Station Agent application is an application that will run on a computer at the TV station's facilities. It has two main responsibilities:

- Retrieving the program information from the newsroom computer system and forwarding it to the MyDTV Server application for processing.
- Receiving the processed metadata from the MyDTV Server application, encoding it for broadcast, and forwarding it to the broadcasting system.

5.1 Assumptions

- The TV Station Agent application will perform only those functions necessary to link the MyDTV server application with the TV station systems. Other than encoding of the metadata, it will not perform any processing functions, serving mainly as a middleman for the information that must be transferred.
- The TV Station Agent application will run on a dedicated computer (not on another computer at the TV station).

5.2 Software Requirements – TV Station Agent

The requirements for the TV Station Agent application can be divided into the following categories:

- Communication
- Retrieval of data from the newsroom computer system
- Forwarding of data to the MyDTV Server application
- Receiving of metadata from the MyDTV Server application
- Encoding of metadata
- Sending of data to the broadcasting system
- Configuration

The software requirements for each of these categories are described below.

Communication

ACOMM001 Communication between the MyDTV Server application and the TV Station Agent application will use the TCP/IP protocol.

ACOMM002 Communication between the TV Station Agent application and the TV station newsroom system will use the TBD protocol. 6-Nov-00

ACOMM003 Communication between the TV Station Agent application and the TV station broadcasting system will use the TBD protocol.

ACOMM004 The TV Station Agent application will be capable of establishing communication with the MyDTV Server application.

ACOMM005 The TV Station Agent application will be able to respond to attempts by the MyDTV Server application to initiate a communication session.

ACOMM006 The TV Station Agent application will be capable of establishing communication with the newsroom computer system and the system that handles the program broadcasting.

Retrieval of Data from the Newsroom Computer System

ARETR001 The software will be capable of retrieving the program information from the newsroom computer system. It will support at least one of the following newsroom systems: Avstar, ENPS (AP), NewsCenter.

ARETR002 The software will be capable of retrieving the chyron information from the supported newsroom computer systems (TBD).

ARETR003 The software will be capable of retrieving the close-captioned text information from the supported newsroom computer systems (TBD).

ARETR004 The software will retrieve program data every $t_{program\_data}$ seconds from the newsroom computer system.

Forwarding of Data to the MyDTV Server Application

AFORW001 The software will be capable of forwarding the retrieved data to the MyDTV Server application.

AFORW002 The software will assign a unique ID to each package of raw data sent to the MyDTV Server application. The ID will be linked to the specific content, therefore is will not be changed if the same content is retransmitted.

Receiving of Metadata from the MyDTV Server Application

AMETA001 **REQ1** The software will be capable of receiving the metadata from the MyDTV Server application.

Encoding of Metadata

Note: At this point, it is not clear whether the software will have to handle encoding of data. It is most likely that it will not have to provide this function.

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AENC001 The software will be capable of encoding the metadata. It will support the following encoding standards: Harris Communication, Divicom, NDS.

AENC002 To switch between the different encoding standards, it will only be necessary to change the software configuration.

AENC003 The software will be capable of encoding both textual data (such as category information) and binary data (such as software version updates).

Sending of Data to the Broadcasting System

ACAST001 The software will be capable of sending the encoded data to the broadcasting system.

ACAST002 The software will be capable of sending a timestamp to the broadcasting system together with the encoded program data.[31]

ACAST003 The encoded data will be sent to the broadcasting system t_{ahead} seconds before the start of the programs to which it refers.[32]

ACAST004 As mentioned previously, each individual transmission of metadata from the MyDTV Server application will have a unique ID. If the TV Station Agent application has not received a new metadata transmission within it defined cycle, it will resend the previous metadata to the broadcasting system.

Configuration

ACFG001 The frequency with which the TV Station Agent application retrieves program data will be a configurable parameter.

ACFG002 The software will allow the user to select the newsroom application used by the TV station.

ACFG003 The software will allow the configuration of parameters related to the retrieval of the raw data, for example, file location and enabling/disabling of specific data retrieval (chyron, close-captioned)

ACFG004 The software will allow the configuration of various communication-related details, for example, IP addresses of TV station computers, and the IP address of the MyDTV server..

[31] This timestamp will be used to synchronize the consumer's computer's time with that of the TV station.

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[32] The encoded data will be sent more than once during this period (in case the Consumer DTV application did not receive it properly the first time).

ACFG005 There will be a remote feature that allows the setting of configuration parameters from the MyDTV Server application.

5.3 Required Hardware – TV Station Agent

5.4 Required Software – TV Station Agent

The TV Station Agent application requires the following software:

- NT Workstation 4.0

6 Appendix A – Interface Definition

6.1 TV Station Agent → Consumer DTV

The following information will be sent by the TV Station Agent application to the Consumer DTV application:

- Program metadata
- Notification of any changes in program broadcast time
- Standard user profiles
- TV station time
- Updated versions of the Consumer DTV application
- EPGs

6.2 TV Station Agent → MyDTV Server

The following information will be sent by the TV Station Agent application to the MyDTV Server application:

- Raw data (play list, closed-caption data, chyron)
- TV Station ID

6.3 MyDTV Server → TV Station Agent

The following information will be sent by the MyDTV Server application to the TV Station Agent application:

- Program metadata
- Notification of any changes in program broadcast time
- Standard user profiles
- Configuration data
- Updated versions of the TV Station Agent application
- EPGs

6.4 MyDTV Server → Consumer DTV

The following information can be sent by the MyDTV Server application to the Consumer DTV application (when using a "with Internet" configuration): 6-Nov-00

- Program metadata

- Notification of any changes in program broadcast time
- Standard user profiles
- Updated versions of the Consumer DTV application
- EPGs

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7 Appendix B - Phase I Requirements

7.1 Assumptions (Phase I)

The requirements described below are based on the following assumptions:

- The user has an Internet connection that can be used for transmitting information from the MyDTV server to the user. (⇆)
- The user's computer has an IP address. (⇆)

7.2 Consumer DTV (Phase I)

General

cGEN007 The software will also run on PCs with the Windows 2000 operating system.

Personal Video Recorder (PVR) Control

cPVR004 The software will provide a visual indication that indicates whether the program currently being viewed is being recorded with a viewing delay.

cPVR005 The software will provide the user with controls for turning off the view-record delay. In addition, the software will provide a slider-type control that will allow the user to move to any point within the delayed material.

EPG (Electronic Program Guide)

cEPG009 If technically possible, programs selected from the EPG will be recorded on the basis of identifying the actual start of the program, rather than relying on the start times provided in the EPG. If this mechanism is used, programs that the user wants to tape regularly will be recorded regardless of what day or time they are shown.[33]

cEPG010 If the imported EPG contains audience age ratings (such as the movie ratings provided by the MPAA), the software will allow use of these parental guidance ratings to override any programs selected for recording.[34]

[33] This will only be possible if the programs broadcast already have some sort of identifying mark.

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[34] It will also be possible to use this feature to allow recording of certain programs but restrict viewing of the programs to specific user profiles.

User Profile

cUP011 The software will allow the use of multiple user profiles on a single machine.

cUP012 The software will allow one of the users to be defined as the "master" user. This user will be allowed to perform certain functions not available to the other users[35].

Comparison of Metadata and User Profiles

cCOMP006 The analysis mechanism will take into account any time zone discrepancies between the user's location and the information contained in the metadata.

cCOMP007 The software will be capable of assigning to each selected program a score representing the degree to which it matches the user's preferences. This will be calculated by adding up the number of user-selected categories/subcategories to which the program belongs (the total number of "hits" that the program got)[36].

cCOMP008 The software will be capable of extracting software version updates which will be included as part of the metadata sent to the consumer.

cCOMP009 (±) The software will be capable of receiving the metadata via an Internet connection.[37]

Program Recording

cREC005 The software will be capable of initiating program recording in response to a user request to begin recording a program immediately.

cREC006 The software will be capable of simultaneously recording a program and playing back the same program with a certain delay.

cREC007 The software will be capable of compressing the recorded program.[38]

cREC008 The software will be capable of identifying the end of a program, and of stopping the recording process when this end is reached.[39]

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[35] May include global filters, user profile conflict-resolution schemes, allocation of disk space to users.

[36] Attempts will be made to come up with a "score" formula that represents the degree to which a program matches a category that it has been assigned to. In addition, some sort of "weights" mechanism can be used, taking into account profile matches, keyword matches, and user requests to record the program.

[37] In the "with Internet" configuration, this feature will be used as a backup mechanism for sending the metadata.

[38] This will depend upon the capabilities of the TV board.

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Recorded Program List

cRPL008 For each program that appears on the *Recorded Program* list, the software will save the cross-links for the program (i.e., the other categories to which it belongs), and the program's "hit" score.

cRPL009 When the user requests to see a list of programs recorded for a single category, the category "hit" score of the program will also be displayed.

Program Playback

Program Archiving

cARC011 When the disk space limit has been exceeded, the user will be offered a choice of deleting programs or compacting one or more programs on disk by saving them in a lower-quality format.

DRB (hardware) Control

cHWC004 The software will be able to work with TV cards from the following manufacturers:

- Hauppauge
- Broadlogic
- Pinnacle
- ATI Systems
- Diamond Multimedia

System Configuration

cCFG001 The software will allow the definition of one of the users as the "master" user. Certain decisions, such as prioritizing user profiles, will be made only by this master user. To input such information, the master user will have to log in with a username and password.

cCFG002 The software will provide a mechanism for prioritizing user profiles in order to overcome any recording conflicts that may arise if multiple user profiles dictate that two programs broadcast at the same time be recorded.[40]

cCFG003 The software will allow the definition of global filters that will be applied to all users (for example, sex, violence).[40,41]

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[39] This assumes that there is some sort of "end of clip" marking.

[40] To be defined by the "master" user.

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cCFG004 The software will allow the definition of global category priorities that will be applied to all users. [40]

cCFG005 The software will allow the allocation of recording disk space to specific user profiles.[40]

cCFG006 (≒) The software will allow the definition of internet connection characteristics: connected (yes/no), speed of connection....

cCFG007 The software will allow the user to designate whether specific defined user profiles are active or not.

Software Modes

cMODE001 The software will provide two modes of operation:

- Consumer mode – for regular use
- Administrator mode – for any required maintenance[42]

Updating of the Software

cSWUP001 (≒) The software will provide a mechanism for downloading software updates from the Internet.

cSWUP002 The software will provide a mechanism for downloading software updates together with the program broadcast.

cSWUP003 The software will provide a mechanism for installing new versions of the software[43]. The mechanism will include notification of the user with regard to how long the software update process will take.

Logging

cLOG006 (≒) When using the Internet connection configuration, the software will log any messages received from and sent to the MyDTV server.[44]

Performance-related Requirements

cPERF005 The software will allow up to 15 channels to be scanned.

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[41] These filters can be applied to recording only, viewing only, or both.

[42] This includes the modification of any system parameters such as the Server IP address.

[43] Will require some way of requiring the system to be turned off.

[44] Due to disk space considerations, this will not include the program metadata itself. The metadata will be logged only in debug mode during development.

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cPERF006 The software will be capable of scanning 15 channels within t_{scan15} seconds[45].

cPERF007 The software will support a maximum of TBD user profiles per consumer.

cPERF008 The software will support a maximum of n_c categories and subcategories.

Usage Reports

cRPT001 (⇆) Usage reports will be sent to MyDTV upon request or according to a fixed schedule.

cRPT002 (⇆) Reports will be sent for each of the following types of information: programs recorded, programs watched, times at which programs watched, user profiles, user commercial profiles (advertising preferences).

7.3 MyDTV Server (Phase I)

Communication

sCOMM006 (⇆) The MyDTV Server application will be capable of establishing communication with the Consumer DTV application.

Data Sent to TV Station Agent Application

sSENT005 The software will be capable of sending the standard user profiles to the TV Station Agent application.

sSENT006 The software will be capable of sending an EPG to the TV Station Agent application.

sSENT007 The software will send the keywords for each program to the TV Station Agent application.

sSENT008 All data sent from the MyDTV Server application to the TV Station Agent application will be encrypted.

Database Management

sDB006 The software will allow the addition of consumers to the consumer database.

sDB007 The software will allow the deletion of consumers from the consumer database.

[45] It is currently estimated that this will require 145 seconds.

sDB008 The software will allow the modification of properties for consumers in the consumer database.

sDB009 (⇆) The software will be able to receive usage and other reports (such as user profile and user filtering) from the Consumer DTV application, and store this data in the database.

Report Generation

The following requirements define reports that the software will be capable of generating on the basis of information received from the consumer software.

sRPT001 (⇆) The software will be capable of generating program rating reports, both for programs viewed, and for programs recorded.

sRPT002 (⇆) The software will be capable of generating user profile reports.

sRPT003 The software will be capable of generating consumer status reports (containing data such as whether or not the consumer is currently connected).

Messages to the Consumer

sMES003 The software will be able to send messages to the consumer via an Internet connection (⇆).

sMES004 (⇆) The software will be capable of sending an EPG to the Consumer-DTV application via the Internet.

sMES005 The software will be able to send standard user profiles to the consumer via an Internet connection (⇆).

sMES006 (⇆) If the matching of category assignments to user profiles is handled by the MyDTV Server application[46], then this application will be capable of sending data for the *To Be Recorded* list to the consumer via an Internet connection.

sMES007 (⇆) If the matching of category assignments to user profiles and management of the *To Be Recorded* list are handled by the MyDTV Server application[47], then this application will be capable of sending specific recording instructions (which programs to record and when) to the consumer via an Internet connection.

[46] as may be the case for the prototype

[47] as may be the case for the prototype

sMES008 (⇆) The MyDTV Server application will be able to send any changes to the category structure (such as new categories) to the Consumer DTV application via an Internet connection.

sMES009 The MyDTV Server application will be able to identify any broadcast time changes for programs whose details have already been sent in the metadata to the consumer. If such changes are detected, the MyDTV Server application will notify the consumer DTV application of the change.

New Versions of Consumer DTV Application

sSWUP001 The MyDTV Server application will be capable of packaging new versions of the Consumer DTV application, and sending the new software to the TV Station Agent application[48].

sSWUP002 (⇆) The MyDTV Server application will be capable of packaging new versions of the Consumer DTV application, and sending the new software to the consumer via the Internet.

sSWUP003 (⇆) The MyDTV Server application will be capable of packaging new versions of the TV Station Agent application, and sending the new software to the TV Station Agent.

Performance-Related Requirements

sPERF007 The MyDTV Server application will support a maximum of TBD consumers.

sPERF008 The MyDTV Server application will support a maximum of 15 TV stations.

sPERF009 The MyDTV Server application will support a maximum of 15 channels.

7.4 TV Station Agent (Phase I)

Retrieval of Data from the Newsroom Computer System

ARETR005 The software will be capable of retrieving the program information from the newsroom computer system. It will support the following newsroom systems: AVstar, ENPS (AP), NewsCenter.

Receiving of Metadata from the MyDTV Server Application

AMETA002 The software will be capable of receiving encrypted metadata from the MyDTV Server application.

[48] The software update will then be sent to the consumer as part of the data that is broadcast.

Configuration

ACFG006 There will be a mechanism for receiving software updates from the MyDTV server and installing these updates.

8 Appendix C - Phase II (Beta) Requirements

8.1 Consumer DTV (Phase II)

General

cGEN008 The software will also run on the following platforms and set top boxes: DirecTV, Echostar DISH Networks, WebTV, Wink, @Home, AOL TV, and OpenTV.

Program Viewing Control

cVIEW004 The software will provide the user with an option of viewing a banner containing basic information about the program, such as title and length. (This banner can be displayed until removed by the user, or, alternatively can be automatically removed from the screen after t_{banner_hold} seconds).

cVIEW005 The software will allow the user to view just the program with no additional information such as the banner.

cVIEW006 The software will allow the user to view up to x channels simultaneously on the screen, using a split screen mechanism (TBD).

EPG (Electronic Program Guide)

cEPG011 The software will allow the user the option of only recording the first x minutes or last y minutes of a program.[49]

User Profile

cUP013 The software will allow the user to select certain across-the-board filters to override the recording of programs that otherwise would have been recorded (for example, not to record programs that contain explicit violence).

cUP014 The software will allow importing/exporting of user profiles so that they can be shared by different users.

cUP015 The software will allow the definition of a broadcast time criterion that overrides program selection for a given profile, for example, not recording programs after 10 pm for a given profile.

[49] If this does not become too complicated, it can be included also as an option for programs recorded automatically on the basis of user profiles.

User Commercial Profile

The consumer's preferences with regard to the following settings are referred to as the consumer's "commercial profile".

cUCP001 The software will provide an option of not recording ads during programs.[50]

cUCP002 The software will provide the user with an option of recording only specific types of ads. The desired categories of ads will be selected by the user.

Comparison of Metadata and User Profiles

cCOMP010 (=) When the Internet connection configuration is used, the analysis will be performed by the MyDTV server application, and only the resulting *To Be Recorded* list will be sent to the consumer application.[51]

Program Recording

cREC009 The software will be able to recognize ads.[52]

cREC010 The software will be able to stop recording when an ad begins and resume recording after the ad has finished.

Program Playback

cPLAY009 The software will allow the user to select an entire category of programs from the *Recorded Programs* list and provide a time limit. The software will then play the last[53] x recordings in the category until the defined time limit is reached. Similarly, the software will allow the user to select a number of categories, and provide a time limit for each. For each category, it will play the last x recordings until the defined time limit is reached.[54]

Program Archiving

cARC012 The software will allow the user to manually select recorded programs for backup to a secondary storage device, for example, video cassette or DVD.

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[50] This will be a service that the user must pay for – in theory, revenue will be shared with advertisers.

[51] When this mechanism is used, the MyDTV server application will have to be informed of any changes to user profiles so that it can continue to accurately select programs based on these profiles.

[52] The mechanism used for this feature will be the same as that used to recognize specific clips.

[53] The term "last" here refers to the last program in terms of the program's start time.

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[54] Alternatively, the order of the recordings played could be based on their "hit" scores, starting with the programs with the highest scores.

DRB (hardware) Control

Communication Sessions

cCOMM001 (=) When a usage report must be sent to MyDTV, the communication session will be initiated by the consumer DTV application.

cCOMM002 (=) If there was a communication failure during a session between the consumer DTV application and the MyDTV server, the consumer software will be capable of reestablishing communication.

Performance-related Requirements

cPERF009 The software will support a maximum of TBD user profiles per consumer.

cPERF010 The software will support a maximum of n_C categories and subcategories.

8.2 MyDTV Server (Phase II)

Construction of EPG

sEPG002 The software will be able to construct an EPG on the basis of the program information received from the TV Station Agent application.[55]

Data Sent to TV Station Agent Application

8.3 TV Station Agent (Phase II)

Receiving of Metadata from the MyDTV Server Application

AMETA003 The software will be capable of receiving new versions of the consumer DTV application from the MyDTV Server application.

[55] In addition, there may be an option to download EPG information from the Internet.

9 Appendix D - Future Requirements

9.1 Consumer DTV (Future)

Program Recording

cREC011 The software will allow a program to be recorded while a second program is being watched, provided the TV card used has two RF inputs.

cREC012 If the user is not currently watching a program, it will be possible to record two different programs that are being broadcast simultaneously, provided that the TV card has two RF inputs.

User Profile

cUP016 (=) The software will provide a mechanism that allows the user to add categories not contained in the default list – either by allowing the user to add their own category (no limit) or by allowing the user to select from an extensive albeit limited list of additional categories.[56]

cUP017 (=) If keywords are sent as part of the metadata, the analysis mechanism will be capable of comparing these keywords to user-defined categories in order to determine whether a given program should be recorded.

9.2 MyDTV Server (Future)

9.3 TV Station Agent (Future)

[56] This feature will be given lowest priority in terms of when it will be implemented.

10 Appendix E – Design Issues

Design Issues – Consumer DTV Application

Since data such as updated software versions will be broadcast to the user, some sort of checksum mechanism may be necessary to test that such data has arrived intact.

Should the scheduling mechanism check every x minutes, or should it be alerted y amount of time before a program is to begin?

The various navigation controls and other GUI elements must take up a minimum of space on the screen.

If the user turns off the view-record delay feature and joins the program at its current point, the material recorded on "delay" will be erased. Similarly, this material will be erased if the user chooses to use the "delay" mechanism a second time.

11 Notes

11.1 Acronyms and Abbreviations

Abbreviation	Description
DRB	Digital Receiver Board
EPG	Electronic Program Guide
GB	Gigabyte
GUI	Graphical User Interface
PVR	Personal Video Recorder
SRS	Software Requirements Specification
TBD	To Be Determined

11.2 Symbols for Constants

Symbol	Description
t_{b_gc}	Minimum time between sending of metadata to the Consumer DTV application and the start of the programs to which the metadata relates.
t_{a_gb}	Minimum time between sending of the encoded metadata to the broadcasting system and the start of the programs to which the metadata refers.
t_{banner_hold}	Amount of time program banner displayed before being automatically removed from the screen.
t_{scan2}	Time required to scan two channels
t_{scan15}	Time required to scan fifteen channels
$t_{program\_data}$	Cycle for receiving program data from the newsroom computer system
n_c	Maximum number of categories and subcategories

11.3 Document Revision History

Document ID	Issue Date	Author	Remarks
202-DTV-010-001	July 31, 2000	Shlomo Shizgal	First Evaluation version
202-DTV-010-001	August 16, 2000	Shlomo Shizgal	Second Evaluation version, following SRR with Gil
202-DTV-010-001	August 24, 2000	Shlomo Shizgal	Third Evaluation version

11.4 Open Items (TBDs)

Section No.	Section Name	Description
3.3	Software Requirements – Consumer DTV	cEPG001 The software will be capable of importing EPGs that are in the following format: TBD.
3.4	Required Hardware – Consumer DTV	Hauppauge WinTV card or BroadLogic TBD card
4.1	Assumptions	The MyDTV Server application will receive as input a list of programs, which will include the program titles and the following additional information: TBD.
4.2	Software Requirements – MyDTV Server	sPERF004 The MyDTV Server application will meet the following reliability criterion: TBD.
5.2	Software Requirements – TV Station Agent	aCOMM002 Communication between the TV Station Agent application and the TV station newsroom system will use the TBD protocol.
5.2	Software Requirements – TV Station Agent	aCOMM003 Communication between the TV Station Agent application and the TV station broadcasting system will use the TBD protocol.
5.2	Software Requirements – TV Station Agent	aRETR002 The software will be capable of retrieving the chyron information from the supported newsroom computer systems (TBD).

6-Nov-00

Section No.	Section Name	Description
5.2	Software Requirements – TV Station Agent	aRETR003 The software will be capable of retrieving the close-captioned text information from the supported newsroom computer systems (TBD).
7.2	Consumer DTV (Phase I)	cPERF007 The software will support a maximum of TBD user profiles per consumer.
7.3	MyDTV Server (Phase I)	sPERF007 The MyDTV Server application will support a maximum of TBD consumers.
8.1	Consumer DTV (Phase II)	cVIEW006 The software will allow the user to view up to x channels simultaneously on the screen, using a split screen mechanism (TBD).
8.1	Consumer DTV (Phase II)	cPERF009 The software will support a maximum of TBD user profiles per consumer.

CHOOSE PROFILE
The Fanatic
The Bitmaster
The Martha
Mr. Power Tie
That Girl
The Archie Bunker
The Real World
The Pledge
9 to 5er
The Soccer Mom
New Urban Dweller

CHOOSE PROFILE
The Fanatic
The Bitmaster
The Martha
Mr. Power Tie
That Girl
The Archie Bunker
The Real World
The Pledge
9 to 5er
The Soccer Mom
New Urban Dweller

CHOOSE PROFILE
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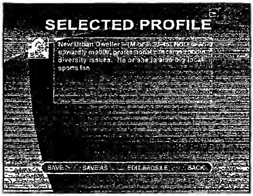
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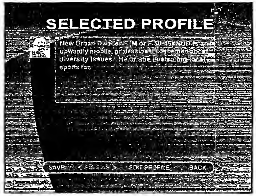
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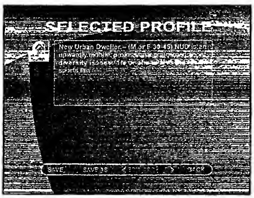
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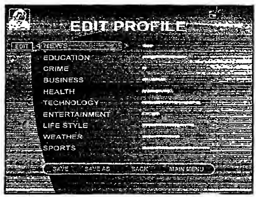
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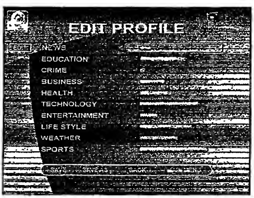
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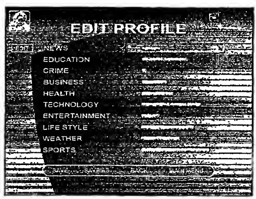
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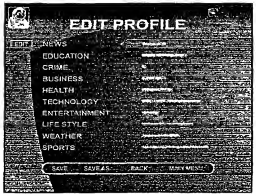
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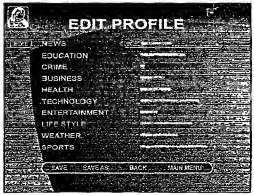
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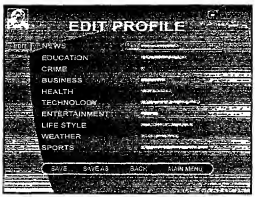
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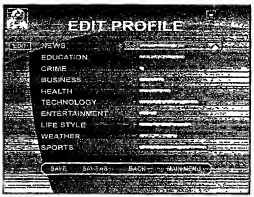
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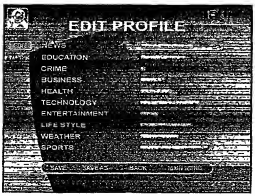
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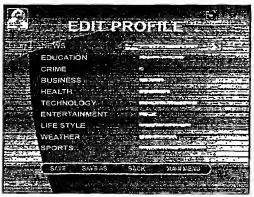
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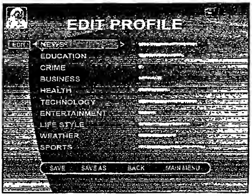
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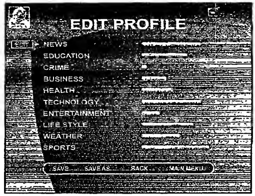
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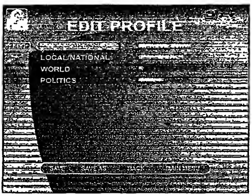
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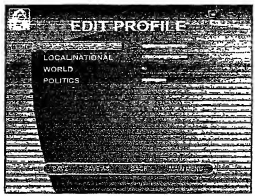
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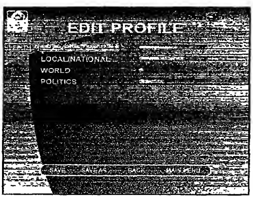
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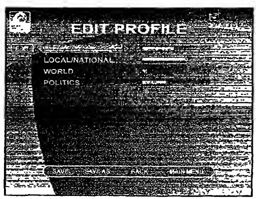
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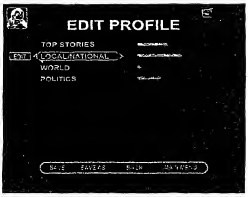

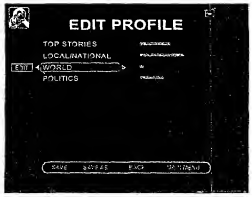

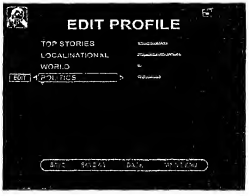

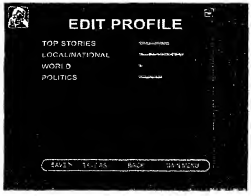

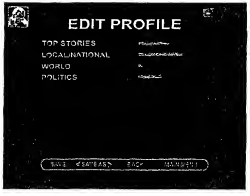


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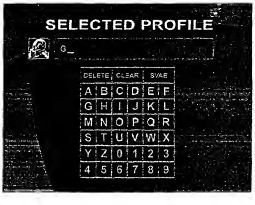
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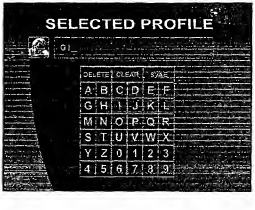
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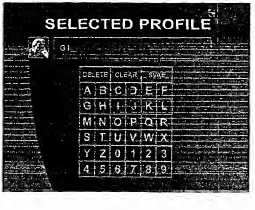
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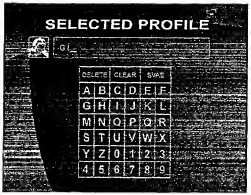

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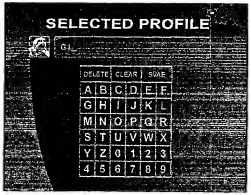

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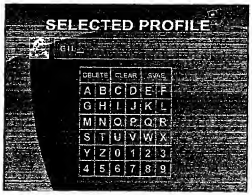

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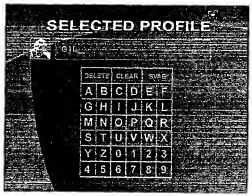

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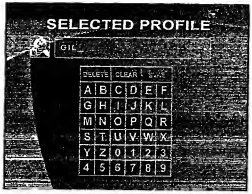

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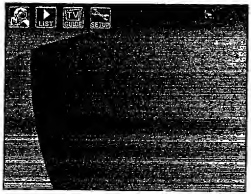

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